Claims in previous application serial No. 09/433,318 filed on 11/03/99. Claims 11-17 (inclusive) allowed on 09/20/01.

What is claimed is:

1. An end launcher of microwave signals with controlled electric field polarization for transition between an MMIC and a waveguide connection, comprising:

-- a universal conductive housing having at least a broad wall and a major wall, at least one cavity with a platform defining a reference plane for the accommodating said MMIC and control components, said reference plane is substantially parallel to said broad wall, having at least one feedthrough mounted in said major wall each with one metal pin having a first end portion and a second end portion;

-- a conductive plate with a first arm having a first axis, a first length and a first width and a second arm having a second axis, a second length and a second width defining a first broad wall and a second broad wall, said first arm and second arm defining a thickness and forming an L-shape waveguide probe, one end portion of said first arm having a slot with a slot width and a slot length for the connection to the first end portion of said metal pin of the feedthrough in said universal conductive housing, said L-shape waveguide probe being aligned so that the second axis is substantially parallel to said major wall of the universal conductive housing, distance between the second axis and said major wall being selected on the basis of frequencies of microwave signals;

-- a conductive universal launching adapter having a through channel with two long inner walls and two short inner walls, said two long inner walls and two short inner walls defining a cross-section of said through channel, said universal launching adapter being mounted to the major wall of said universal conductive housing, position of the second arm of said L-shape waveguide probe is adjusted to be substantially at a central region of the cross-section of said universal launching adapter; and

-- a waveguide section with two broad inner walls and two narrow inner walls, said two broad inner walls and two narrow inner walls defining a cross-section of said through channel.

2. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1, wherein said first length, second length, first width and second width of said L-shape waveguide probe being selected according to operating frequencies of said microwave signals and characteristic impedance.

3. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1, wherein distance between said major wall of the universal conductive housing and said second axis is selected to be substantially equal to a quarter of wavelength of microwave signals being excited to increase the launching efficiency.

4. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1, wherein said slot width is slightly greater than diameter of said metal pin to facilitate attachment of said L-shape waveguide probe to said metal pin.

5. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1, wherein said second axis of L-shape waveguide probe being aligned to be parallel to said major wall of the universal conductive housing and parallel to said broad wall of the universal conductive housing, the long inner walls of said through channel being aligned to be perpendicular to said reference plane or broad wall of the universal conductive housing and the two broad inner walls of said universal launching adapter being aligned to be perpendicular to said reference plane or broad wall of the universal conductive housing, for the excitation of microwave signals with electric fields substantially parallel to said reference plane or broad wall of the universal conductive housing.

6. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1, wherein said second axis of L-shape waveguide probe being aligned to be parallel to said major wall of the universal conductive housing and perpendicular to said broad wall of the universal conductive housing, the long inner walls of said through channel being aligned to be parallel to said broad wall and the two broad inner walls of said universal launching adapter being aligned to be parallel to said reference plane or broad wall of the universal conductive housing for the excitation of microwave signals with electric fields substantially perpendicular to said reference plane or broad wall of the universal conductive housing.

7. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1 wherein the thickness of said L-shape waveguide probe is chosen to be in a range from 50 micrometers to 400 micrometers.

8. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1 wherein said L-shape waveguide probe is fabricated by a micro lithography and etching method from a conductive sheet, a layer of metal is deposited on all walls of said L-shape waveguide probe to increase surface conductivity, said metal for the layer being selected from a group consisted of gold and silver.

9. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1 wherein alignment of said L-shape waveguide probe to said metal pin is performed in a precision alignment jig, said precision alignment jig has one preformed shallow cavity to accept said L-shape waveguide probe and a platform to accept said universal conductive housing, said distance between the second arm and the major wall of said universal conductive housing being maintained by separation between an edge of said platform and said shallow cavity, the connection of said L-shape waveguide probe to said metal pin is achieved by welding.

10. An end launcher of microwave signals for transition between an MMIC and a waveguide connection in Claim 1 wherein alignment of said L-shape waveguide probe to said metal pin is performed in a precision alignment jig, said precision alignment jig has one preformed shallow cavity to accept said L-shape waveguide probe and a platform to accept said universal conductive housing, said distance between the second arm and the major wall of said universal conductive housing being maintained by separation between an edge of said platform and said shallow cavity, the connection of said L-shape waveguide probe to said metal pin is achieved by soldering.

11. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization, each of said non-symmetrical waveguide probes having a thickness, a first arm with a first width and a first length, a second arm with a second width and a second length, and a slot in one end portion of said first arm, said method comprising the steps of;

-- coating a first layer of photosensitive material on a front surface of a conductive substrate and coating a second layer of photosensitive material on a back surface of said conductive substrate ;

-- forming patterns of said non-symmetrical waveguide probes and connecting wires between adjacent waveguide probes on the front surface of said conductive substrate by photolithography;

-- etching said conductive substrate having said patterns thereon;

-- removing said first layer of photosensitive material;

-- removing said second layer of photosensitive material, and ;

-- removing said connecting wires.

12. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization in Claim 11, wherein said conductive substrate is selected from a material group consisted of brass, tungsten and copper.

13. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization in Claim 11, forming of said patterns further comprising a step for forming second patterns on the back surface of said conductive substrate for reducing undercutting.

14. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization in Claim 11. further comprising a step of coating a layer of metal on surfaces of said etched substrate to increase surface conductivity and to facilitate subsequent bonding, after removing said second layer of photosensitive material, method of coating said layer of metal being selected from a process group consisting electrodeposition and vacuum deposition..

15. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization in Claim 11 wherein thickness of said waveguide probes is formed to be in a range from 50 micrometers to 400 micrometers.

16. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization in Claim 11 wherein said first width, second width, first length and second length are determined on the basis of the range of frequencies of operation of microwave applications.

17. A method for fabricating simultaneously a plurality of non-symmetrical waveguide probes for end launching of microwave signals with controlled electric field polarization for microwave applications in Claim 14 wherein material of said layer of metal being selected from a group of Au and Ag.